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ABSTRACT

A study of the effect of implementing educational innovations in local schools across the country explored several factors affecting successful improvement. This paper provides a general overview of the interrelation among these factors, with illustrative diagrams. Particular attention is paid to innovations requiring major changes in teacher behavior, involving 88 teachers at 48 sites. To develop an individually-focused model, researchers tested perceived benefits, degree of change, the level of use of the innovation, and fidelity to the original innovation concept. Possible predictors included elapsed time, hiring of additional staff, demands of the innovation affecting practice, and readiness to implement the innovation. Potential factors affecting these variables included the teacher's use of time, the teacher's commitment, teacher characteristics, staff cohesiveness, group opinion of the practice, and financial and material support. Also considered were the sources of assistance available to teachers responsible for implementing changed. Results of the study showed teacher commitment and use of time as key factors. Researchers also developed a school-focused model, considering such additional factors as institutionalization of the innovation, plans for continuation, organizational change, the principal's role, teacher control of the innovation, and the institutional environment. Results stressed the principal's importance. (PGD)

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MODELS OF THE SCHOOL IMPROVEMENT PROCESS: FACTORS CONTRIBUTING TO SUCCESS

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A Study of Dissemination Efforts Supporting School Improvement

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Models of the School Improvement Process: Factors Contributing to Success

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When two researchers agree on their observations of a phenomenon, it's called reliability. When a near multitude agree on a complex set of phenomena, it's called news! Perhaps it's one of the few discernible results of the Jupiter effect, but consensus seems to be building about the change process in local schools. Our own work (Crandall et al, 1982) added to other recent studies and syntheses, most importantly the Study of the R&D Utilization Program (Louis and Rosenblum, 1981), confirm that innovations can indeed be transferred with reasonable fidelity, that interpersonal external assistance is imperative, and that a constellation of actors within the school can join forces to initiate and carry out school improvement projects.

While this convergence within the research community is a salutory, if not unique, event, the intersect of these findings/conclusions with the reality articulated by dissemination practitioners may well be historic. Presentations to such groups are eliciting, "Yeah! That rings true for me," reactions like never before. The message for those concerned with research utilization seems clear -- your investment in this area is really beginning to pay off; field people are finding more and more relevance in those research results. Ironically, just as the theory-practice gap closes, offering real traction to those pursuing school improvement, the basic infrastructure which has emerged and coalesced over the past several years is being threatened by unprecedented assaults. Our ultimate response to the twin challenges of increasing confidence (in what to do) and decreasing resources (to do it) remains to be seen.

We remain optimistic. A large part of our optimism flows from our experience in the Study of Dissemination Efforts Supporting School Improvement, a massive federally-supported investigation into local change efforts nationwide. During our field work, we encountered large numbers of teachers in schools all across America who were willingly exerting themselves, in concert with administrators and outside assisters, to responsibly alter and improve the learning opportunities presented to their children.

The research referred to in this paper was conducted under contract with the U.S. Department of Education, the Office of Planning, Budget and Evaluation. The opinions expressed are those of the authors and do not necessarily reflect the position or policy of the Department of Education, and no endorsement by the Department should be inferred.

Furthermore, they were sticking to it, and, they were succeeding. Their reports of major changes in their classrooms and schools, and improvement in student attendance, attitude, and achievement present a very different picture from that offered up on the pages of our local papers and in national news magazines. Inconceivable as it may seem, a substantial number of our schools may be doing just fine, and are actively working to get better, if those our researchers visited are any indication. So, who are these people and what did we learn about them and their activities?

The Features of our Sample

Our researchers visited local schools (N = 146) in 10 states (Arizona, California, Illinois, Maine, Maryland, Michigan, Nebraska, Pennsylvania, South Dakota, and Virginia) representative of the continental United States. Using questionnaires and interviews, they surveyed teachers (N = 366) involved in innovation development and implementation, their principals and superintendents (N = 274), a smaller group of central office staff (N = 78) who were actively involved in supporting their implementation efforts, and individuals from outside the district who had been funded to assist in various improvement efforts (N = 96). These last were associated with one or more of the innovations (N = 63) included in our sample. In addition, a specially-designed questionnaire was administered to the total faculty of each school building (N = 3129). The schools represented a quite decent demographic mix -- elementary (56.2%), middle/junior (13%), senior (26%) and other (4.8%); urban (11.6%), suburban (35.0%), and rural (52.7%). The schools ranged in size from 18 to 3092 students ($\bar{x}$ = 611). In addition to this panoramic snapshot, we also deployed a field team (nee ethnographers) who visited each of 12 schools several times over the course of the 1979-80 school year.

The primary focus of our research was on the dynamics of local implementation efforts. Each local effort was connected with a single federally-sponsored activity, explicitly designed to encourage and support school improvement. We selected four strategies, each of which was exemplified by a programmatic activity.[1] The major distinctions among the strategies concern the locus of initiative (federal-state-local), the extent of interpersonal assistance, and the locus of such assistance. They also reflect a crude cost continuum. The four strategies and the federal programs chosen to embody them were:

[1] In another component of our Study, we interviewed federal program staff associated with 46 dissemination or dissemination-related programs and activities. Brief profiles of these programs are included in The Overview of Dissemination Activities in the Department of Education, Hellmer, Harris, and Thompson (1981). Thirteen of these were the subjects of extensive case studies. The four chosen here represented the substantial range of strategic choices available to those wishing to encourage local choice and improvement.

- Interpersonal Linkage (National Diffusion Network, including Title I and Follow Through)

- Commercial Marketing/Distribution (Bureau of Education for the Handicapped Marketing Program)

- State-Administration of Dissemination (ESEA Title IV-C Adoption/Adaptation Grants)

- Local Development/Invention (ESEA Title IV-C).

Three of these four are clearly dissemination approaches, where an innovation developed in one site is selected for implementation in another. In contrast, the last strategy -- Local Development -- represents an approach where indigenous resources are mobilized to invent, develop, or refine an innovation in a host district.[2]

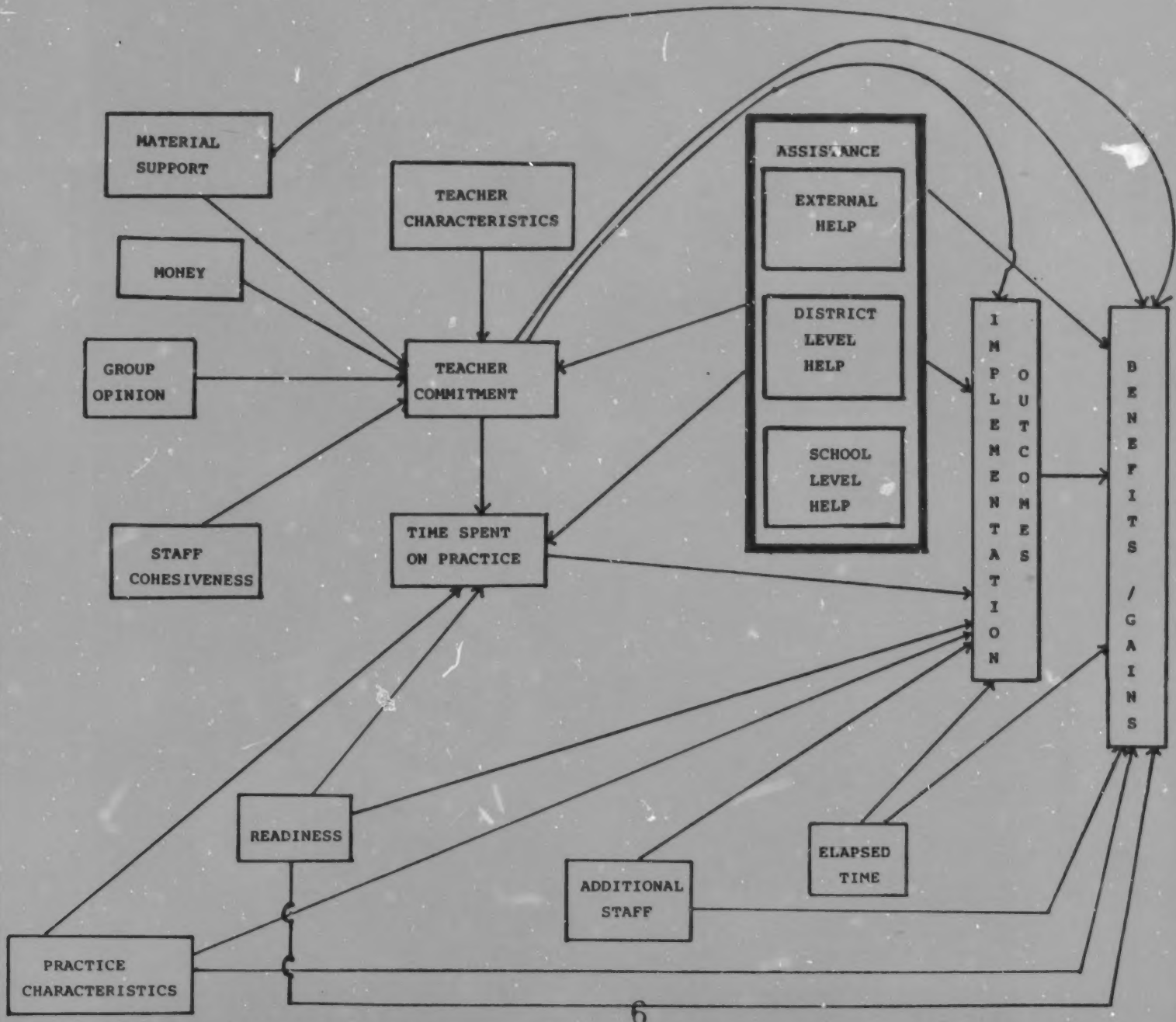
More detail regarding the Study design, our sampling procedures, and our various data collection and analysis methodologies is available in other documents (Crandall, et al, 1982; Huberman and Crandall, 1982; Huberman & Miles, 1982). Our master report volumes detail our findings in a way which cannot be duplicated within the confines of an overview paper. In this paper we wish to present a series of causal models which display the core of our findings and set the stage for the companion papers prepared by members of our Study team (Bauchner & Loucks, 1982; Cox & Havelock, 1982; Loucks & Cox, 1982).

We have taken the position here and elsewhere (Crandall, 1981) that school improvement should concentrate on efforts which directly provide superior or additional services to students, e.g., those involving a teacher's implementation of a new curricular or instructional practice. It is in teaching-learning transactions that the rubber hits the road, so to speak. Our research focused on attempts of teachers to gain increased traction by choosing and using a new practice to improve their instruction. We posited a model to test the causal relationships associated with selected implementation outcomes, as well as the perceived benefits of implementation (which was as close as we could get to an impact outcome) at this individual level. A complementary school-focused model exploring the outcomes of organizational change, plans for continuation, and institutionalization was also tested, and is discussed later. Figure 1 displays the general structure of our individual-level model.

It is important to recall that ours was a sample of schools actively involved in an identifiable school improvement effort. As such, while the states were chosen to be representative and a stratified three-stage cluster sample was employed, our sample

[2]The Rand Change Agent Study (Berman and McLaughlin; 1978), though often cited in discussions of dissemination efforts, was a study of this type of innovation effort -- local invention in a single site.

Figure 1: General Structure of the Individually-Focused Model



most certainly does not represent all schools in the U.S. Nonetheless, since we drew our sample from a total census of schools involved in the strategies of interest in the states we sampled, we were unable to identify other efforts having external sponsorship and support (although likely there were internally-initiated efforts within individual districts), we feel quite confident that 80% of the ongoing activity was caught in our net.

Definitions of Variables

The variables in the individually-focused model we tested are defined as follows:

- Perceived benefits: defined as the number of benefits (gains) users report receiving. We construed perceived benefits as the ultimate outcome state for any given individual and then worked back to three behavioral-ly-oriented implementation outcomes:

- Change in practice: the difference between a user's current practice (i.e., that resulting from implementing the innovation of interest) and his/her past practice, calculated from scores on a "practice profile."[3]

- Practice-specific mastery [Level of Use (LoU)] (Hall, Loucks, Rutherford, and Newlove, 1975): a measure of whether, and then how, the new practice was being used; eight levels are possible -- nonuse, orientation, preparation, mechanical use, routine use, refinement, integration, renewal.

- Fidelity: the degree to which a user's practice approximates the developer's ideal with respect to the configuration of its components as reflected on the practice profile.

The possible predictors of these outcomes are several:

- Elapsed time: how long the teacher had been using the innovation.

- Additional staff: whether or not new staff had been hired expressly to assist in the innovation implementation.

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[3]The construction of "practice profiles," employing a methodology based on the concept of innovation configurations (Hall and Loucks, 1981), enabled us to create "standardized" scores for each teacher-innovation pair. The profiles allowed us to determine how much practice change had in fact been demanded by the adoption of the innovation, how much change had resulted from implementation to date, and to what extent a faithful replication had been achieved. Details of the procedure are available in Loucks and Crandall, 1982.

- Practice characteristics: an assigned index reflecting the relative prescriptiveness of the innovation (i.e., the range of variation deemed acceptable by the developer for the innovation's components) and the innovation's implementation requirements (e.g., training, materials, personnel).

- Readiness: the extent to which the knowledge, attitude, materials and skill necessary to implement the practice were in place prior to initial use.

Recalling Figure 1, we posited that the last two of the foregoing might effect one or more of the outcomes directly, as well as impact on the cluster of variables concerned with the teacher's allocation of time to innovation implementation-related activities. More specifically,

- Teacher time: the amount of time users spent on innovation implementation-related activities. Factor analysis yielded five distinct areas: time spent actually doing the practice in the classroom, time spent on materials (i.e., finding, selecting, developing, coordinating), time spent participating in training activities, time spent in evaluation of the status and impact of the innovation implementation; and secondary dissemination (i.e., time spent communicating with others about the innovation and its implementation).

This central cluster of variables was then posited to be the product of certain sorts of assistance users received, to be described shortly, and

- Teacher commitment: the degree to which the user felt the innovation implementation was important to his or her daily professional life, induced pride, and reflected an (individual) special contribution.

The conventional wisdom suggests that this commitment to, or "ownership" of, the innovation is vital to successful implementation. We believed it could be the product of several variables, specifically:

- Teacher characteristics: this includes a teacher's experience (i.e., years of teaching) and his/her professionalism, assessed by determining the number of professional meetings, conferences, and university courses recently attended and the number of professional journals regularly read.

- Staff cohesiveness: the building staff's view of the extent to which their colleagues function as a group of isolated individuals or a single cohesive group, and the principal's relationship to these interaction patterns.

- Group opinion of the practice: defined as the extent to which support or opposition to the innovation implementation was evident.

- Money and material support: the extent these items were available to assist the user's implementation efforts.

Lastly, we were concerned with the contribution of various types of assistance received by the teachers, in particular:

- School-level help: this encompasses variables assessing the amount and type of assistance provided teachers by the principal and/or fellow teachers within the building.

- District-level help: assistance provided teachers by individuals from within the district but outside the building, usually curriculum coordinators connected to the central office. We dubbed these individuals "local facilitators."

- External help: the assistance received by users from anyone outside their school district, particularly funded change facilitators or developers, referred to as external agents.

The companion papers to the present document focus in greater detail on each of these sources of potential assistance. Further, we have developed a fully elaborated model of the last-mentioned item -- external help -- which is set forth in our master report series. For the overview purposes here, suffice it to note that the external help variable cluster links our individually-focused model and the antecedents of its outcomes with the antecedents of external assistance reflected in our external agent model. Before moving on to a discussion of the models, let us briefly present a truly major finding which emerged early in our analysis.

The Difference Between Attempting Major and Minor Changes

Our initial analyses were frustrated by the dreaded "no significant differences" result. Stunned, but undaunted, we regrouped and reviewed the situation. The application of our best conceptual and methodological minds to the dilemma (plus some good old-fashioned luck) led us to an apparently straightforward proposition; albeit one that had been untestable until the development of a methodology that yielded individual case by case data on each innovation-user pair. We speculated that users for whom a new practice represented a major change from what they knew and did previously would be involved in fundamentally different dynamics than those for whom an innovation represented only a minor change in their instructional procedures.

Dividing the sample into these two groups (partitioning into three or four groups did not yield meaningful differences from the ultimate two group clustering), we discovered two quite distinct patterns. Since the balance of this paper deals only with those attempting a major change, let me briefly summarize the general

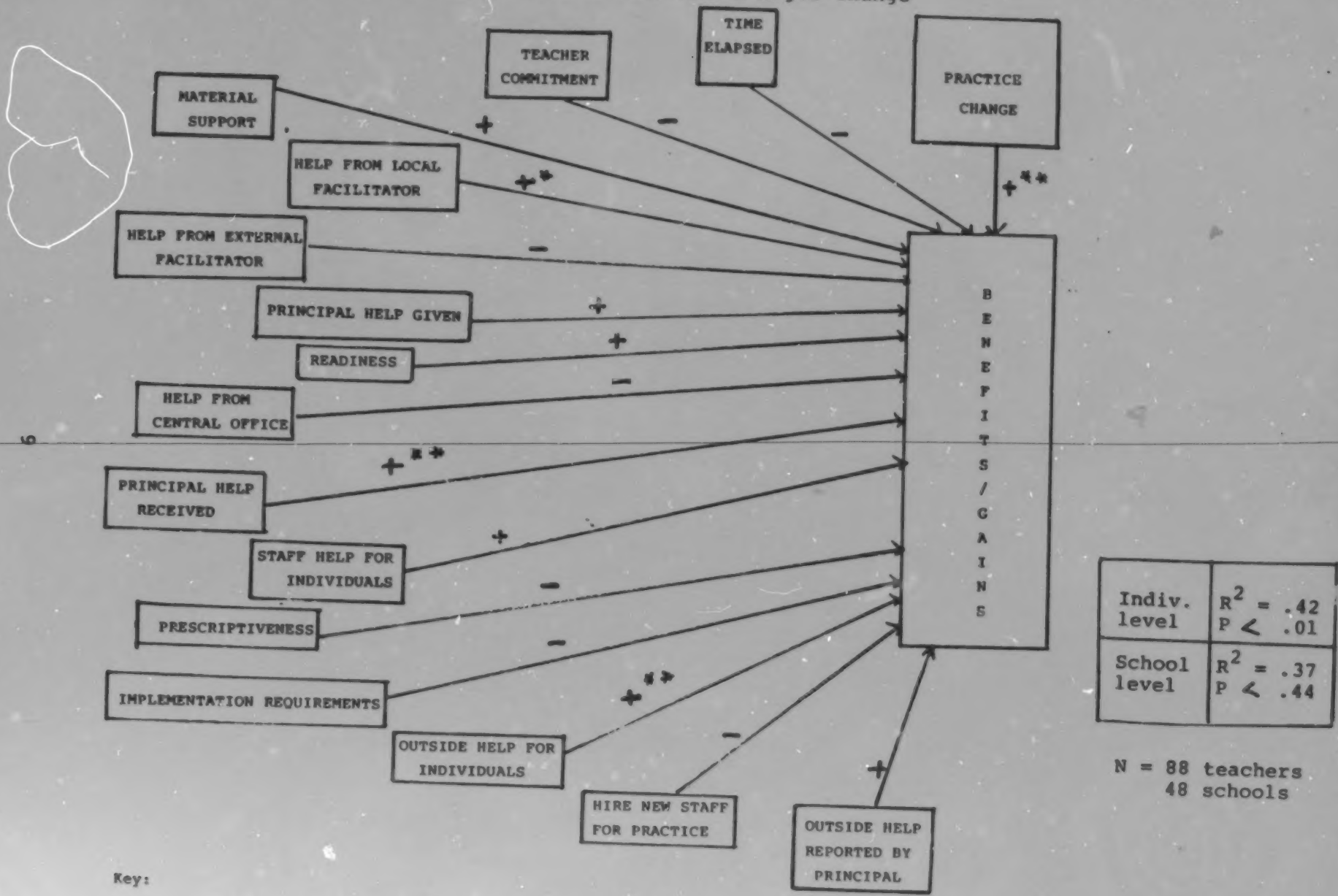
findings regarding the minor change group. Several iterations of the model for this subset were run, each systemically removing variables of little consequence. The end result was a picture of extreme, if distressing, simplicity. With change in practice as the implementation outcome of interest, we achieved a significant result ($R^2 = .45$, $p < .04$) for the group of 75 users in 52 sites whose innovation attempts were quite modest. The significant predictors were teacher commitment and elapsed time, both of which are rather difficult to influence. (The full meaning and import of this comment with respect to teacher commitment will become clear by the end of the document.) None of the assistance variables play important roles in producing the outcome, nor does the time spent on implementation-related activities. The passage of time and a sustained intrapersonal state explain it all. Set'em and forget'em seems to be the strategy of choice. This being the case, we devoted the bulk of our remaining analyses to understanding the major change group. What we learned there follows.

Overview of the Findings for Our Individually-Focused Model

Recall that our interest was in understanding the dynamics of successful local school improvement efforts. For us, this meant discovering and explaining beneficial results associated with the actual implementation of a new practice (an innovation) by teachers in a school building. In particular, we wanted to know how various players assisted or inhibited such improvement efforts. We explored the contributions of those in the immediate vicinity of the (user) teacher (i.e., other teachers, staff and the building principal), as well as those typically more distant from the daily routine (i.e., central office personnel and external facilitators). We also were interested in the part played by certain other ingredients (e.g., the normative reality or climate within a building, the availability of various relevant resources, and the demands of the particular innovation) that the literature on school-based change and the direct experience and orientation of the members of the Study team indicated were promising. The general model already introduced reflected the relationships we pursued using a least-squares approach. All variables in the individual-level model were adjusted for site level effects. After eliminating cases with missing data, we were left with a sample of 88 teachers and 48 sites. Comparisons with the larger sample on key variables revealed no non-random bias in this subset.

The paragraphs which follow summarize the results of testing the model for the various outcomes and their antecedents. For greater clarity, we have chosen to first unbundle some parts of the model in the accompanying figures, then finally reassemble all in a more complex display. In each figure, we have adopted the convention of displaying signs (i.e., + or -) on all paths, even when they were not significant, since they represent the best available estimate and may be of interest to some readers.

Figure 2: Factors Influencing Benefits of the Practice as Percived by Teachers for whom the Innovation Implementation Required a Major Change



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We attained a significant model for the benefits variable reflecting the number of gains users reported accruing to them as a result of implementing the new practice ($R^2 = .42$, $p < .01$). These benefits result principally from the change in practice achieved by teachers, principal help given to teachers, and the assistance they received from individuals outside the district. Figure 2 displays this version of the model.

Change in practice, as can be seen in Figure 3, is enhanced primarily by classroom use of the practice ($R^2 = .49$, $p < .04$), secondarily by readiness, and help from the local facilitator (that individual, usually based in the central office, whom users reported as having assisted with the implementation). Time spent on materials detracts from change, as does external agent help, in general. [Let us note that when the external assistance variable is unbundled, a positive contribution is made by activities directed to particular user's implementation (e.g., planning implementation schedules, assisting teachers in working out procedural details, and providing follow up technical assistance.)]

Practice-specific mastery (measured by Levels of Use) is, however, largely the product of time spent on materials and on communicating about the practice ($R2 = .50$; $p < .04$). See Figure 4.

Fidelity of the new practice to the form stipulated by its developer was also the result of time spent on classroom use and principal help to the users, the latter being a direct effect unmediated by teacher time ($R2 = .53$; $p < .02$). Figure 5 details the full set of relationships.

How teachers who are implementing a new practice (our users) spend their time emerges as a matter of central importance. Our attempts to determine the antecedents of this time allocation were quite revealing, as Figure 6 displays. Only teacher commitment emerges clearly as the primary predictor of both classroom time and evaluation time. A significant ($R^2 = .25$, $p < .06$) was attained; prescriptiveness of the practice has a negative contribution.

Teacher commitment, therefore, seems a very important predictor of a whole chain of events. If we could explain its origins, we could wrap everything up in a big red bow! Unfortunately, for the individual model, we can only say what does not predict commitment. As shown in Figure 7, none of our measures of assistance (i.e., principal, local facilitator, or external agent), traditional teacher characteristics (i.e., experience and professionalism), or resource availability (i.e., money and materials) significantly explain teacher commitment.

The centrality and importance of substantial teacher commitment or ownership is underscored by the consistent pattern shown in subsets of the sample. When the local development sites are removed, leaving a sample of 61 teachers and 35 sites associated

Figure 3: Factors Influencing Change in Classroom Practice by Teachers for whom the Innovation Implementation Required a Major Change

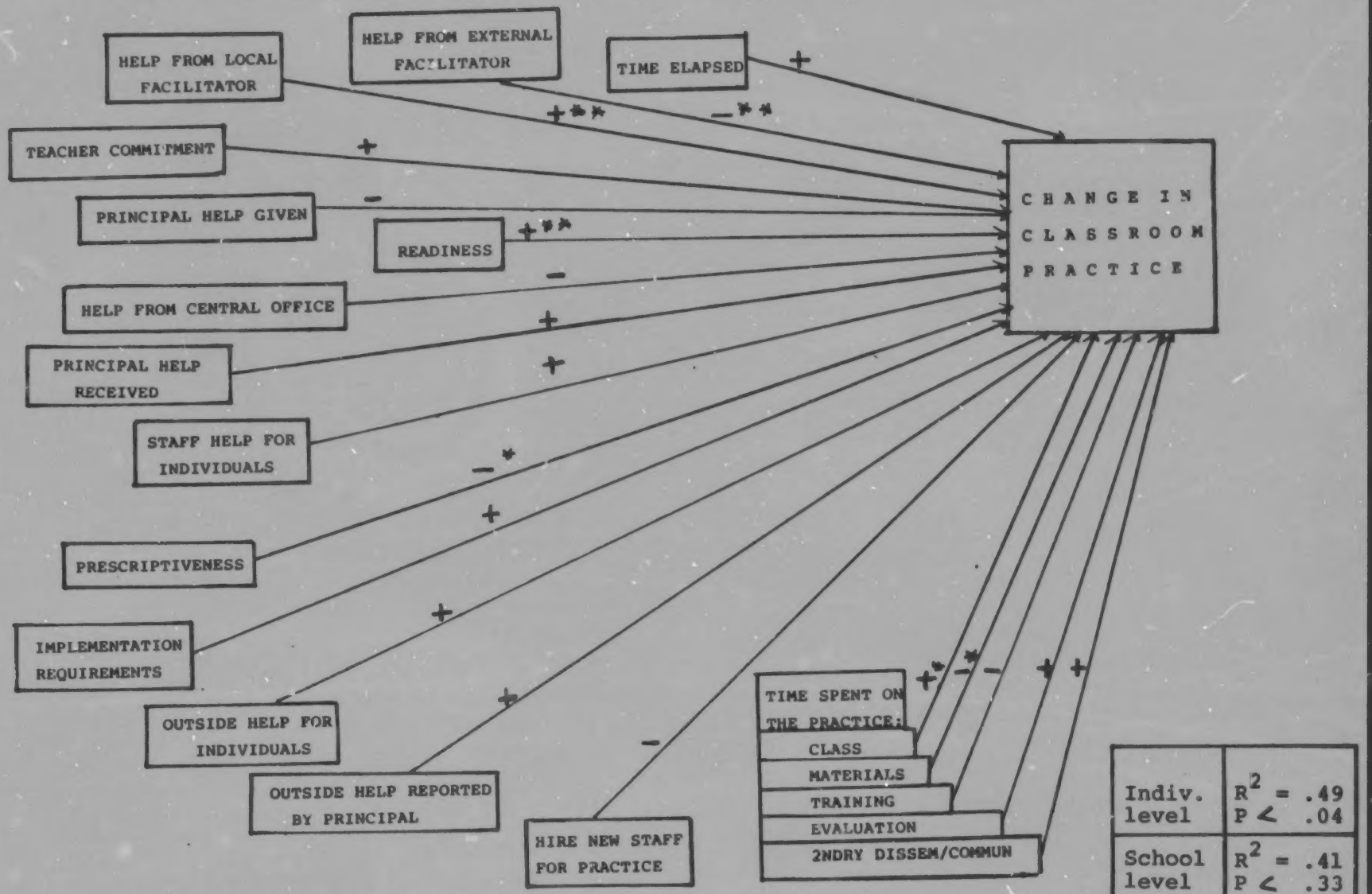


Figure 4: Factors Influencing Practice-Specific Mastery by Teachers for whom the Innovation Implementation Required a Major Change

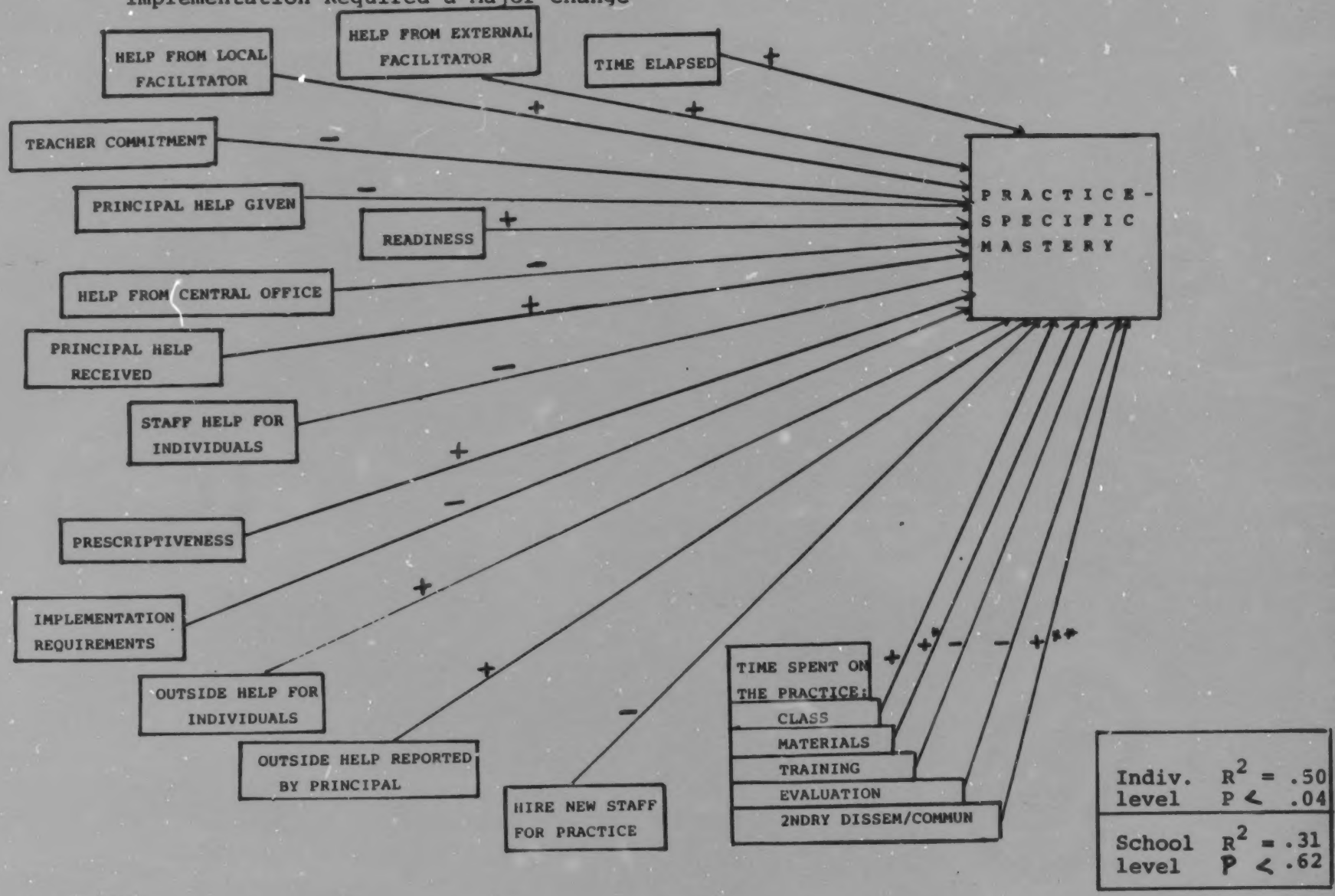
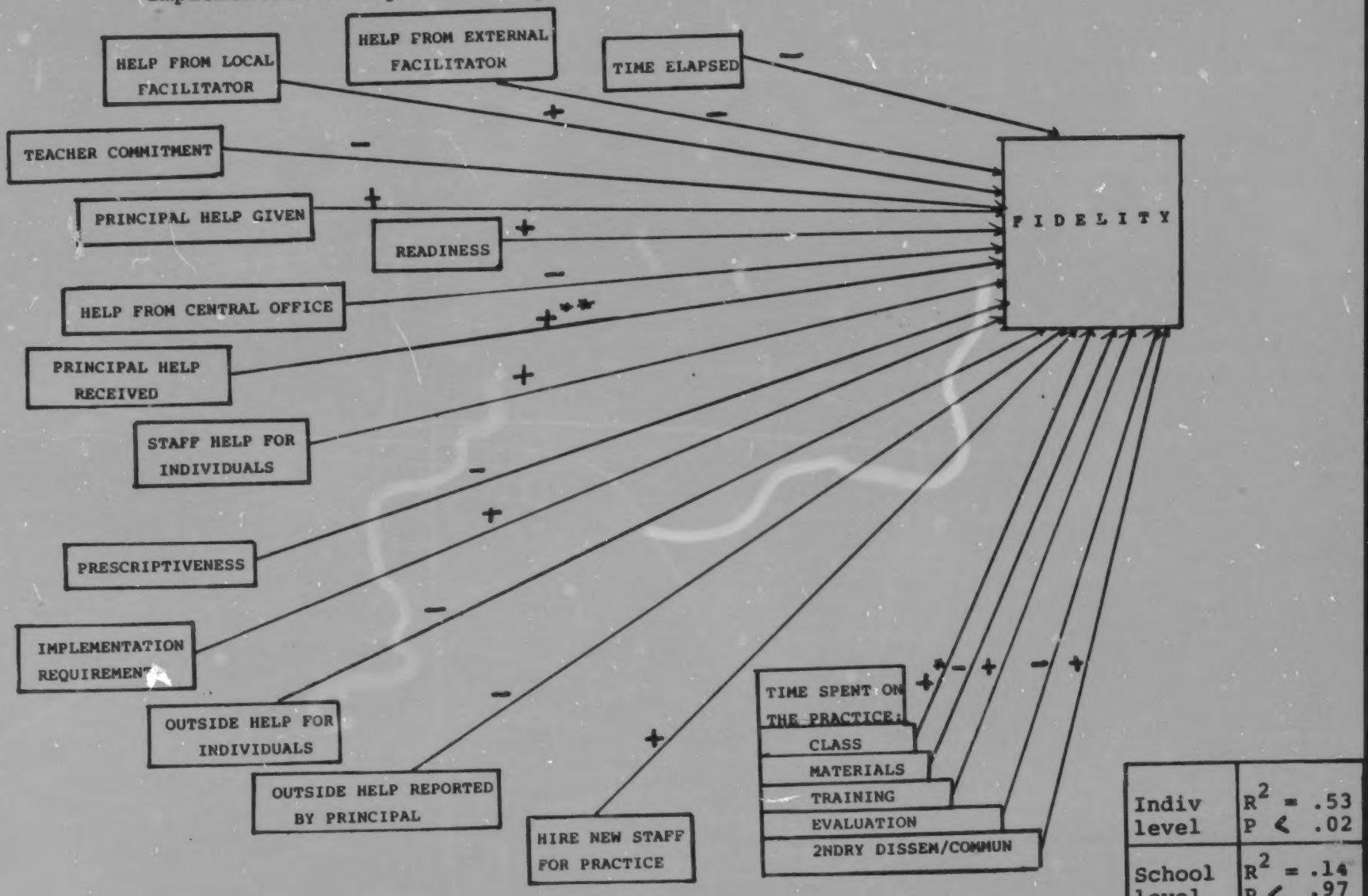


Figure 5: Factors Influencing Fidelity to the Practice by Teachers for whom the Innovation Implementation Required a Major Change



KEY:

+ or - = not significant
+ = borderline significance
+** = significant

Figure 6: Factors Influencing Time Spent on the Practice by Teachers for whom the Innovation Implementation Required a Major Change.

	TIME SPENT ON				
	CLASSROOM USE OF THE PRACTICE R^2 = .10 ind. P < .53 level R^2 = .14 school P < .81 level	MATERIALS FOR THE PRACTICE R^2 = .11 ind. P < .46 level R^2 = .16 school P < .76 level	TRAINING FOR USE OF THE PRACTICE R^2 = .04 ind. P < .86 level R^2 = .20 school P < .64 level	EVALUATING THE PRACTICE R^2 = .25 ind. P < .06 level R^2 = .19 school P < .67 level	COMMUNICATING ABOUT THE PRACTICE R^2 .13 ind. P < .39 level R^2 = .17 school P < .73 level
TEACHER COMMITMENT	+ **	+	+	+ **	+
HELP FROM WITHIN THE STAFF FOR INDIVIDUALS	-	+	+	+	+
PRINCIPAL HELP RECEIVED	-	+	-	+	+
HELP FROM OUTSIDE THE DISTRICT FOR INDIVIDUALS	-	+	+	+	+
STAFF COHESIVENESS	+	+	-	-	+
READINESS	-	+	-	+	+
IMPLEMENTATION REQUIREMENTS OF THE PRACTICE	+	+	-	+	-
PRESCRIPTIVENESS OF THE PRACTICE	-	-	-	- **	+
HELP FROM EXTERNAL FACILITATOR	+	+	+	-	+
HELP FROM LOCAL FACILITATOR	-	-	-	+	-
PRINCIPAL HELP GIVEN	+	-	+	+	+

KEY:

+ or - = not significant
* = borderline significance
** = significant

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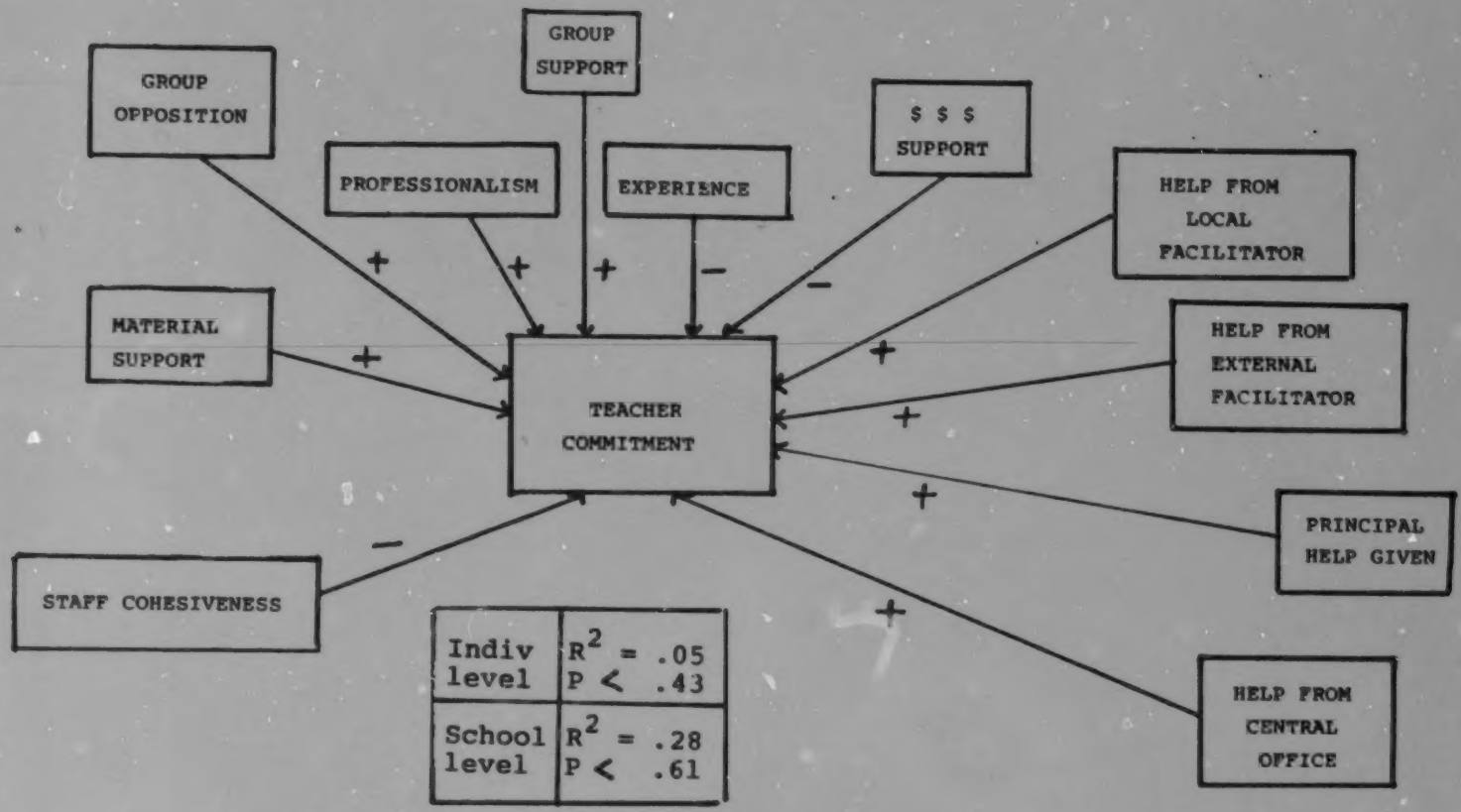
Figure 7: Factors Influencing Commitment to the Practice of Teachers for whom the Innovation Implementation Required a Major Change



N = 88 teachers
48 schools

Key:

+ or - = not significant
* = borderline significance
** = significant

with the formal dissemination strategies (i.e., the NDN and state-administered programs), the change outcome is explained almost exclusively by commitment ($R^2 = .65$, $p < .03$.) For the NDN sample (including Title I), a sample of 42 teachers and 20 sites, commitment, along with school-level assistance, also yields a significant change outcome ($R^2 = .61$, $p < .006$). This is clearly a non-trivial phenomenon, just as the conventional wisdom suggests. Some hope is offered by a variable inserted in our school-level model (teacher control over the practice) which emerges as a significant positive predictor of teacher commitment, as does local facilitator assistance. So, while we may not have both hands firmly on the throat of this elusive beast, we do have a decent grip, giving us increased confidence about its roots. This rapid fire overview can only gloss over the conceptual coherence illustrated by the figures. Perhaps reflecting on Figure 8, where the majority of the relationships are illustrated simultaneously, will bring the larger picture into focus.

Let us now leave the individually focused model and turn to that model focused on school outcomes.

Overview of Findings for the School-Focused Model

While our principal concern lay with phenomena enacted at the individual teacher level, we recognized that for such efforts to have lasting effects they must go beyond individual classrooms. Transitory innovation is hardly defensible as a policy goal. Rather, one hopes that the new and presumably superior practice will attain stability and become part of the core of a school's instructional offering. This stability is encompassed in the multi-faceted variable:

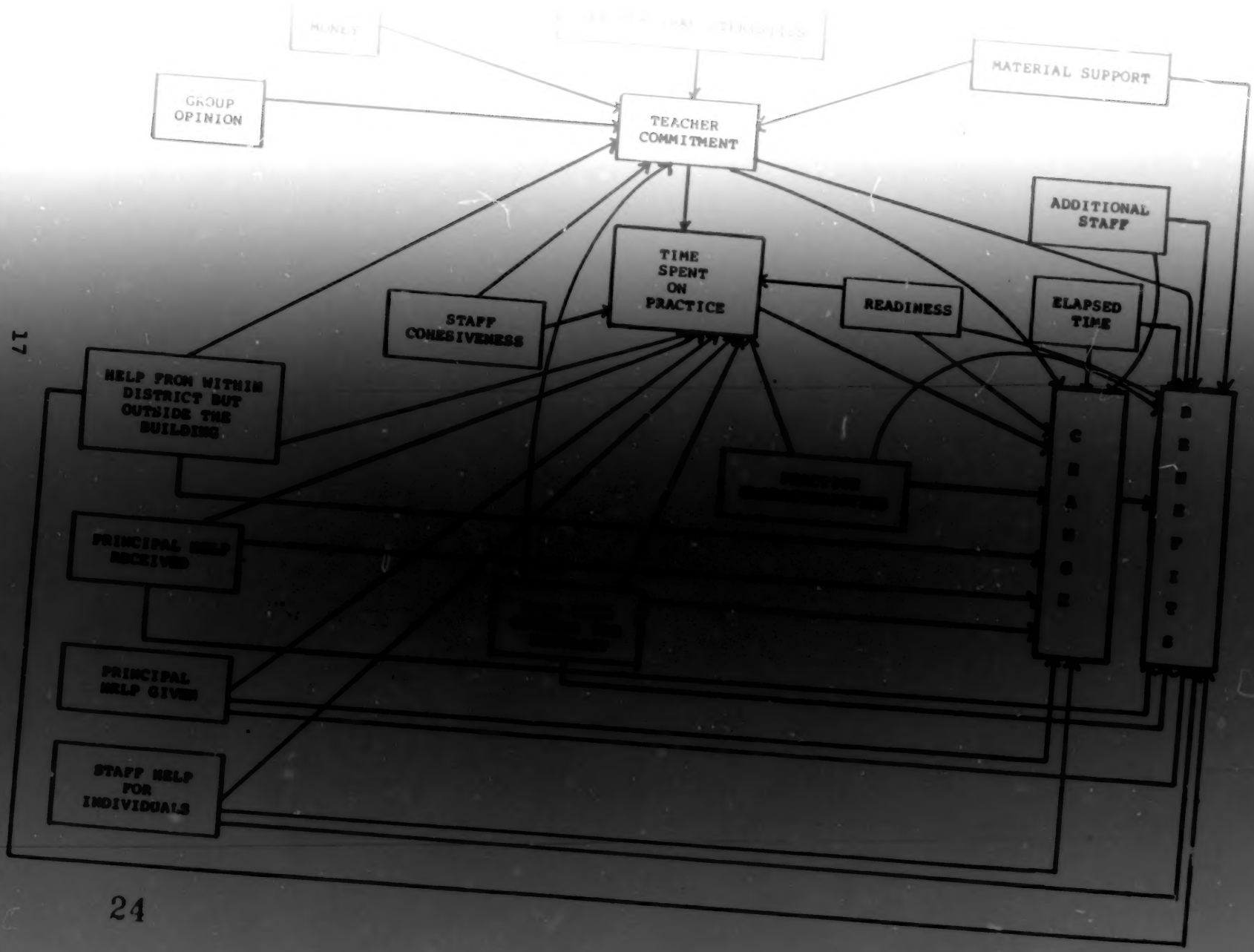
- Institutionalization, defined as the degree to which the practice has become a regular aspect of school life which is not dependent upon present personnel.

Institutionalization is generally regarded as the ultimate school-level outcome of any innovation implementation endeavor. However, we felt it important to capture two other constructs which constituted important consequences at the school level. The first was:

- Plans for continuation, defined as the likelihood that use of the practice would be eliminated, reduced, maintained, or expanded.

Further, we wanted to ascertain the extent to which these efforts, though directed primarily at altering individual behavior, may have impacted on larger aspects of the schools as a whole, hence our variable:

- Organizational change, defined as those benefits (reported by building administrators) which impacted on aspects of school life other than individual teachers or students (e.g., improvements in staff socio-emotional state, staff skills, instructional methods, external communication).



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Other variables involved in our model which have not been defined previously are:

- Principal management style -- teachers' perceptions of how the principal responds to their concerns and communicates with them.
- Administrator power over the implementation -- whether administrators were decision-makers in the adoption process and/or had a role in controlling the implementation,
- Principal leadership -- the degree to which the principal actively focuses the direction of activity in the school building,
- Principal commitment to the practice -- the degree to which the principal feels personally involved with, and critical to, the implementation effort,
- Principal help received -- this is the same variable as used in the individually-focused model,
- Faculty attitude toward school improvement -- the opinion expressed by building faculty that the level of school improvement activity should be lowered, maintained, or increased.
- Pro-active problem-solving -- the conduciveness of the environment to such problem-solving, as indicated by the extent to which faculty agree that procedures exist for dealing with problems, that decisions are made by people possessing adequate and accurate information, and that decisions, once made, carry clear action implications. [This measure, like that of principal leadership, is a replication of items used in the I/D/E/A Study of Educational Change and School Improvement (Bentzen and Associates, 1974).]
- Degree the practice solves problems -- a report by users as to whether the new practice solves problems which they have grappled with for some time.
- Teacher control (over implementation of the practice) -- users' assessment of their influence on decisions affecting project implementation, and their ability to surmount obstacles in the course of implementation.
- Personal gains -- those benefits reported by users which accrued to them as individuals (versus those associated with student growth).

- Practice-related mastery -- a measure (Level of Use) of the user's relative facility with whatever variation of the practice they were employing, unconstrained by the developer's stipulations of acceptable variation and required components.

An inspection of Figure 9 will reveal what we learned after several iterations of the model using a maximum-likelihood approach. Analyses were run on the total data set, that is, all sites with no missing data were included (N = 82) regardless of whether a major or minor change was being attempted. The relationships displayed in the figure reflect the best explanation for the outcomes of interest we could discover; others were hypothesized and were rejected empirically.

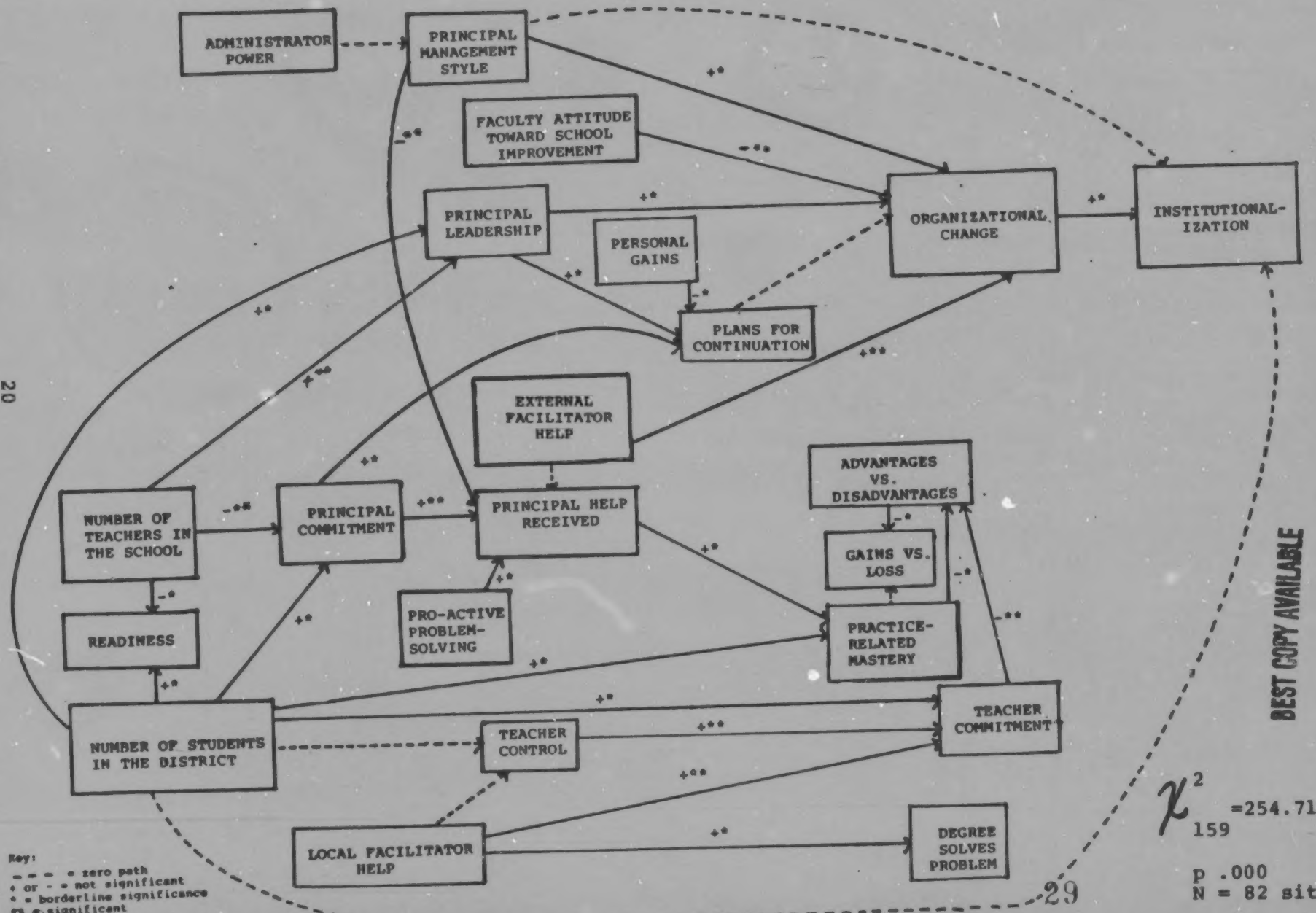
The figure illuminates a most interesting phenomenon. What we see are two distinct but interdependent patterns, one leading to teacher or instruction- related variables (e.g., commitment and mastery), the other to organizational variables (e.g., organizational change). And it is the principal who provides the link between these two processes. [See Bauchner and Loucks (1982) for a detailed discussion of the principal's influence.]

Other actors in the constellation also emerge as critical to success. The external agent's help is the principal predictor of organizational change, which in turn offers the only route to institutionalization. This, in fact, seems to be where the external agent makes his or her major positive contribution to the school improvement process (after introducing the new practice to the system). Note, of course, that we did discover positive effects associated with providing post-adoption assistance to individual implementers. Cox and Havelock (1982) explore this important role as we found it in our sample, while the implications for training of such outside helpers is addressed in Crandall and Loucks (1982).

In addition to the crucial role of the external agents in producing this outcome chain, note the centrality of the principal. His/her management style and leadership are important positive predictors of organizational change. These scores, based on the judgments of the entire faculty, describe an in-charge professional -- one who knows what's happening and is directing it. (A cautionary note when generalizing: principals who claimed no knowledge of the practice were dropped from this analysis. Such individuals constituted approximately 20% of the building administrator sample.) These schools are not "loosely-coupled". Might there be a message here about where change efforts should be concentrated? This press for progress is obviously able to overpower general faculty attitudes favoring the status quo or a cutting back of improvement efforts.

Turning next to those relationships among instructionally-related variables, the principal also looms large. His/her commitment to the practice is a precursor to help given teachers, which here, as

Figure 9: Relationships Among Factors Influencing School-Focused Outcomes



$\chi^2_{159} = 254.715$

p .000

N = 82 sites

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in the individual model, is positively and significantly related to an outcome. Note though that while such commitment contributes to plans for continuation (of the practice), it is insufficient in the absence of principal leadership.

The context which the principal creates is clearly of importance as is that within which s/he operates. The ingredients of an environment conducive to pro-active problem-solving are within the control of the principal. Again, our data reveal a situation characterized by clarity, communication, and direction induced by the principal and accepted (if not endorsed) by the faculty. This manifestation of the "implicit covenants", (Crandall, 1981; Parish, 1980) governing school life may strike some as less than ideal; nonetheless, they seem undeniably real and typical.

School and district size also are influential. Large districts are positively associated with greater readiness, principal commitment and leadership, teacher commitment, and user mastery. However, large schools are associated with lower readiness and principal commitment, but greater principal leadership. Given their influence, and how easily the information can be acquired, noting the size of school and district and planning accordingly would seem an important early step before provoking an improvement effort or responding to an invitation to help innovate.

Filling out the picture, of course, brings one to the all-important local facilitators, who are typically the initiators of improvement activities. The role has already been shown to be crucial to the mix in our individually-focused model. Here we see their help predicting problem alleviation, as well as greater teacher commitment.

Of course, since this segment of the model deals with the instructional arena, the teacher must be included to secure closure. Our Study began with the belief that teachers were central. Our individually-focused model affirms the importance of their classroom time allocation to effecting change, and also found, but could not explain, the major contribution of commitment to this activity as well as outcomes. Hence, it is appropriate, albeit fortuitous, that this explanation ends by noting that in the school-focused model, teacher commitment is shown to be the direct result of the extent to which they believe they control and can influence their implementation efforts.

By understanding the interplay between the constellation of key actors who we have shown to be linked to the success of school improvement efforts and their contexts, those concerned with school improvement can surely enhance their positive impact. The results from these models yield a map of the pathways to success and suggest where and how to best focus energy for school-based improvement efforts. The companion papers provide additional descriptions and discuss action implications in more detail.

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